# Stoichiometry of Precipitation Reactions Worksheet

1) What mass of NaCl is required to precipitate all the silver ions from 50.0 mL of a 0.0700 M solution of $AgNO_3$?
   a. Write the balanced net ionic equation for this reaction.
   b. How many moles of $Ag^+$ do you have?
   c. How many moles of $Cl^-$ do you need to precipitate all the silver?
   d. How many moles of NaCl do you need to produce this much $Cl^-$?
   e. How much does this amount of NaCl weigh?

2) What mass of $(NH_4)_2S$ is required to precipitate all the magnesium ions from 150.0 mL of a 0.80 M solution of $Mg(ClO_4)_2$?
   a. Write the balanced net ionic equation for this reaction.
   b. How many moles of $Mg^{2+}$ do you have?
   c. How many moles of $S^{2-}$ do you need to precipitate all the magnesium?
   d. How many moles of $(NH_4)_2S$ do you need to produce this much $S^{2-}$?
   e. How much does this amount of ammonium sulfide weigh?

3) What mass of $Sn(NO_3)_4$ is required to precipitate all the sulfide ions from 1.25 L of 3.0 M $K_2SO_4$?

4) What mass of iron(III) chloride is needed to precipitate all the chromate ions from 234 mL of a 0.100 M lithium chromate solution?

5) What mass of barium sulfate is produced when 100.0 mL of a 0.200 M solution of barium chloride is mixed with 100.0 mL of a 0.300 M solution of iron(III) sulfate?
   a. Write the balanced net ionic equation for this reaction.
   b. How many moles of $Ba^{2+}$ and $SO_4^{2-}$ do you have?
   c. Which one is the limiting reactant?
   d. How much barium sulfate can you expect to produce?

6) What mass of solid AgBr is produced when 100.00 mL of 0.250 M $AgNO_3$ is added to 20.0 mL of 1.00 M NaBr? What is the concentration of each ion remaining in solution after the reaction is complete?
   a. Write the balanced net ionic equation for this reaction.
   b. How many moles of $Ag^+$ and $Br^-$ do you have?
   c. Which one is the limiting reactant?
   d. How much AgBr can you expect to produce?
   e. Calculate the moles of each ion remaining in solution after the reaction is complete.
   f. Calculate the concentration of each ion remaining in solution after the reaction is complete.

7) A 100.0 mL aliquot of 0.200 M aqueous potassium hydroxide is mixed with 100.0 mL of 0.200 M aqueous magnesium nitrate. What mass of precipitate is formed? What is the concentration of each ion remaining in solution after the reaction is complete?

8) How many grams of silver chloride can be prepared by the reaction of 100.0 mL of 0.10 M silver nitrate with 100.0 mL of 0.20 M NaCl? Calculate the concentration of each ion remaining in solution after precipitation is complete.

9) How many grams of precipitate will form when you mix 35.0 mL of 0.10 M sodium hydroxide with 24.1 mL of 0.24 M iron(III) nitrate? Calculate the concentration of each ion remaining in solution after precipitation is complete.

ANSWERS:
1) 0.246 g NaCl needed
2) 15.2 g $(NH_4)_2S$ needed
3) 660 g $Sn(NO_3)_4$ needed
4) 4.76 g $FeCl(CO_4)_3$ needed
5) 2.33 $BaSO_4$ produced
6) 3.62 g AgBr formed, $[NO_3^-]$=0.125 M, $[Na^+]$=0.167 M, $[Br^-]$=0.0417 M
7) 0.582 g $Mg(OH)_2$ formed, $[NO_3^-]$=0.200 M, $[K^+]$=0.100 M
8) 1.4 g AgCl formed, $[NO_3^-]$=0.50 M, $[Na^+]$=0.33 M, $[Cl^-]$=0.050 M
9) 0.17 g $Fe(OH)_3$ formed, $[Na^+]$=0.059 M, $[NO_3^-]$=0.32 M, $[Fe^{3+}]$=0.02 M